

EPA Superfund
Record of Decision:

MINOT LANDFILL
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION VIII 999 18th
STREET - SUITE 500 DENVER, COLORADO 80202-2466

RECORD OF DECISION

OLD MINOT LANDFILL SUPERFUND SITE
MINOT, NORTH DAKOTA

JUNE 1993

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Old Minot Landfill
Minot, North Dakota

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Old Minot Landfill site, in Minot, North Dakota, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of North Dakota concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

The selected remedy addresses the potential risks identified at the site by treating leachate and managing the discharge of leachate and landfill gases. This action incorporates removal, treatment and containment technologies. The major components of the remedy include:

- Institutional controls to prohibit construction on the landfill, or the use of water beneath the landfill or in the immediate vicinity of the landfill for drinking water purposes.
- Leachate extraction and treatment in the City of Minot wastewater treatment facility.
- Consolidation of contaminated soil in the vicinity of leachate seeps under the cap, and cap improvements to limit precipitation infiltration and control stormwater runoff.
- Ground-water monitoring to allow detection of future releases of contaminants to the ground water.
- Landfill gas collection using an active collection system and a tall stack for dispersion venting. EPA may modify the system design to accommodate site conditions, following installation of the leachate collection system.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, substantively complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. A waiver from the State standard for landfill cap permeability is justified under the requirements of Section 121(d)(4) of CERCLA since the combination of landfill capping and leachate extraction will attain an equivalent standard of performance through the use of another method or approach. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this site. There are no principal threats at the site. However, this remedy satisfies the statutory preference for treatment as a principal element of the remedy through treatment of the leachate. The size of the landfill and the fact that there are no on-site hot spots that represent the major sources of contamination preclude a remedy in which contaminants could be excavated and treated effectively.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

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**OLD MINOT LANDFILL
RECORD OF DECISION**

I. SITE NAME AND LOCATION

The Old Minot Landfill Superfund site is a closed waste disposal facility located in Section 27, Township 155 North, Range 85 West, approximately one mile southwest of downtown Minot, in Ward County, North Dakota. The site is situated approximately 2,000 feet south of the Souris River and is located to the east of the intersection of the Burdick Expressway and the combined U.S. Highways 2 and 52 Bypass. Although the site was originally thought to cover 45 acres, including two burial cells (A and B), the fill area that received municipal and industrial waste actually covers approximately 17 acres. Land use in the vicinity of the site is light industrial and residential, with areas southwest of the site used for agriculture. Figure 1 shows the site location relative to the state of North Dakota, and Figure 2 shows the location of the landfill with respect to the City of Minot. A map of the site, including burial cells A and B, is presented in Figure 3.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Operation

The Old Minot Landfill (Cell A) operated from 1961 to approximately October 1971. The facility was sited under the direction of the Minot City Council within a natural coulee southwest of Minot, North Dakota. The landfill was operated by Allen Long, Superintendent of Sanitation for the City of Minot, during the approximate 10-year site life, and accepted municipal and industrial waste from the surrounding area. An estimated 75 tons/day of waste were placed in the landfill during its operation.

Although the property has had several owners since 1961, the past owners were not involved in the facility's operation. Jenner, Inc., purchased much of the property in 1975 for development. Since then the land has been returned to the former owner, Marjorie Kermitt. One of the parcels is currently owned by Farstad Oil, Inc.

The exact composition of wastes disposed at the landfill is not known. Discussions with past landfill operators indicated refuse was received from the City of Minot, other neighboring towns, farms, industries, and military sites.

The site may have also received arsenic-contaminated soil and residues. It is also likely that common solvents used in a variety of local industrial applications would have been disposed of in the landfill. Records and interviews with past employees indicate that wastes were not segregated during the filling operation. All waste was disposed of as it arrived. The refuse was covered daily with clay-rich soil; therefore, it is probable that numerous cells of refuse exist.

The landfill was closed in the fall of 1971. Since the waste was placed at the base of a coulee, the ridges making up the valley walls were used as a final cover. The refuse was covered with about three feet of clayey material from the valley walls and seeded. Subsequent recreational activities and traffic on the covered area increased erosion across the site.

An area (Cell B) northwest of Cell A was landfilled in the late 1960s with construction debris. The City of Minot has indicated that the disposal activities in Cell B were unrelated to the City's municipal solid waste landfill operations.

2. History of Response Actions

In mid-1985, the First District Health Unit (FDHU) of Ward County received a complaint of gas bubbles escaping from the surface of the site. Upon inspection of the site, the Chief Sanitarian of the FDHU contacted the North Dakota State Department of Health (NDS DH), Environmental Health Section, about his observations of foul odors, gas bubbles in standing water, and water drainage from waste. The NDS DH Division of Hazardous Waste Management and Special Studies responded to the request from the FDHU with a site inspection to confirm earlier observations.

The NDS DH arranged a meeting at the site in late summer with the City of Minot and the landowners. The NDS DH requested the landowner (represented by Odell-Wentz & Associates) to control surface water drainage, to repair eroded channels, and to install a gas venting system. The NDS DH contacted the Region VIII U.S. Environmental Protection Agency (EPA) office to discuss the investigative approach for the site. EPA proposed to conduct an initial study of the site utilizing an EPA contractor under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

A preliminary assessment/site inspection (PA/SI) was conducted at the Old Minot Landfill in early June 1986. Four borings were completed and four monitoring wells were installed at the landfill by Water Supply, Inc., under the direction of the Ecology & Environment Field Investigation Team (E&E FIT), an EPA contractor. One well was located upgradient of the landfill to provide background water quality data, and two wells were located downgradient. One boring was advanced through refuse to characterize the waste. Soil samples, ground-water samples, and sediment and surface water samples were collected for analysis. Air samples were also collected for analysis in the summer of 1986.

In September 1986, the NDS DH conducted a site inspection to see if the corrective measures requested in 1985 had been implemented. The site inspection noted that some erosional channels and depressions had been filled across the site and a road (18th Street Southwest) had been constructed across the southern edge of the fill. However, more landscaping and a gas ventilation system were once again requested of the landowner. As a result, Deucalion Research, Inc., proposed to the NDS DH to construct a gas recovery system at the site and utilize the gas as an energy source.

The results of the sampling by E&E FIT became available in late September 1986. Soil boring and sediment samples detected several organic chemicals. Metals were also detected at concentrations slightly above background sample concentrations. Off-site sediment samples taken near the Souris River and city water intake detected a number of aromatic hydrocarbons as well as fluoranthene and pyrene. Samples of water in an on-site ditch near a leachate seep contained organics and metals. Analysis of ground-water samples collected on-site detected several organics and metals. Air monitoring detected traces of organics at variable concentrations dependent upon wind velocity and direction.

The EPA developed a preliminary hazard ranking system (HRS) score for the site in late 1986. The final ranking was completed in September 1987 and indicated that the Old Minot Landfill should be proposed for placement on the National Priority List (NPL) for cleanup. This information was released in June 1988.

The Old Minot Landfill was placed on the NPL in March 1989. During June and July 1989, the City of Minot conducted interviews with the past operators of the landfill to help determine waste types and PRPs. The EPA Region VIII Emergency Response Branch requested the U.S. Bureau of Reclamation (USBR) to prepare a background report of existing conditions. Recommendations were made by the USBR to control surface erosion, to investigate ground-water conditions more thoroughly, and to determine the cause of leakage around gas recovery test wells installed earlier by Deucalion. As a result, the City of Minot fenced burial site A, constructed drainage controls, and completed cap repairs.

In the latter part of 1989, the City of Minot proposed to take the lead in the program and retained SEC Donohue as a consultant for services at the Old Minot Landfill Superfund site. Identification and notifications of other PRPs by the EPA continued. The City of Minot received a draft Consent Order and Work Plan for the removal action (fence installation, surface runoff diversion, and erosion control devices). A fence was installed to confine access to site A, as per negotiations with the EPA. The EPA contacted over 100 PRPs for information. As a result, the City of Minot conducted a meeting in January 1990 to inform those people and/or businesses about the Superfund process.

In March 1990, SEC Donohue split samples with the EPA during a confirmation sampling of three of four wells sampled in 1986 by E&E. The contaminant levels in the refuse well were similar to those detected by E&E in the FIT report of June 1986.

In April 1990, Science Applications International Corporation (SAIC) prepared a summary report on available data at the Old Minot Landfill Superfund site in response to a request by the EPA.

Results of the review concluded that the release of hazardous constituents to either ground water or surface water at the Old Minot Landfill Superfund site did not pose an immediate threat. Recommendations were made to further define the ground-water system and waste boundaries, and that monitoring of ground water, surface water, and air should continue.

The City of Minot, as well as other identified PRPs, received a Statement of Work (SOW) and draft Administrative Order on Consent (Consent Order) in June 1990 that was prepared by the EPA for implementing a Remedial Investigation/Feasibility Study (RI/FS). During negotiations on the draft Consent Order, the City of Minot indicated that it was unwilling to reimburse EPA for oversight costs and would not agree to be subject to conditions under which it could be assessed stipulated penalties. Consequently, a Unilateral Administrative Order (UAO) and Statement of Work was issued by EPA on September 28, 1990. The City of Minot, which was identified as a PRP in the UAO, agreed to comply with the order (letter dated October 10, 1990) and retained SEC Donohue to prepare the RI/FS Work Plan. The RI was completed and the RI report was submitted in February 1992. The FS was finalized and submitted to EPA in November 1992. It should be noted that RI and FS efforts were limited to Cell A (see Figure 3) and did not include Cell B. This decision was made based on available analytical data which suggested that there was no substantial evidence linking environmental contamination of surface water, ground water, or sediment with Cell B. Unlike the investigations performed within the Cell A area, drilling operations in the Cell B area encountered no domestic or industrial wastes. According to the records, construction debris was the only material encountered throughout the Cell B drilling efforts. EPA will continue to evaluate additional information, as it becomes available, and may initiate further investigations of Cell B if warranted.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

A public meeting was held, concerning the landfill, by the City of Minot in January of 1990. An EPA community involvement coordinator conducted interviews of Minot citizens during the week of September 25, 1990. A Community Relations Plan for the Old Minot Landfill site was finalized in November 1991. This document lists contacts and interested parties throughout government and the local community. It also establishes communication pathways to ensure timely dissemination of pertinent information. As a result of community interviews conducted in 1990, it was determined that there was a general concern that EPA was spending the community's money on unnecessary activities. In response to this concern, EPA chose to limit future Community Relations Program actions to the minimum permissible under CERCLA and EPA policy.

The Baseline Risk Assessment was released in April 1992, and the RI was completed and released to the public in May 1992. An information update concerning human health risks associated with the site that were detailed in the risk assessment report was provided in the Minot Daily News on July 17, 1992. The FS was finalized in early December 1992, and a Proposed Plan for the landfill was mailed to interested parties in late December 1992. All of these documents were made available in both the administrative record and the information repository maintained at the Minot Public Library.

A public comment period was held from January 4, 1993 to February 2, 1993, and a public meeting was held at 7:00 p.m. on January 19, 1993 at the Minot City Hall to present the results of the RI/FS and the preferred alternative. During the public meeting a proposed alternative developed by the City of Minot was also presented by a Minot City Council member. Substantial modifications of the original proposal were addressed in subsequent letters from the City of Minot. The plan was formally adopted by the Minot City Council as Resolution #1306, and several letters of support for the proposal were received from area businesses and organizations. EPA also received several requests from the community for a 30-day extension to the public comment period and extended the deadline to March 4, 1993. Comments which were received by EPA prior to the end of the public comment period, including those expressed verbally at the public meeting, are addressed in the Responsiveness Summary which is attached, as Appendix B, to this Record of Decision.

IV. SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses the potential threats to humans and the environment resulting from future migration of leachate and gas emissions from the Old Minot Landfill Superfund site. Specific elements that the response action will address in eliminating or mitigating the potential threats include: (1) the landfill must have a cap that is adequate to prevent direct contact by

receptors with the waste or leachate; (2) the leachate levels in the landfill must be managed to prevent leachate seeps through the cap and to reduce the potential for leachate migration from the landfill in the ground water; (3) the landfill gas must be controlled to reduce pressures in the landfill that can damage the landfill cap and can increase the potential for leachate migration; (4) institutional controls must be implemented to prohibit any human activity on the landfill that would expose receptors to refuse or leachate, or that would damage the containment system; and (5) ground water in the vicinity of the landfill must be sampled and analyzed at regular intervals to demonstrate that the selected remedy is effective.

V. SITE CHARACTERISTICS

The Old Minot Landfill is located in a deep ravine which has small, ancillary rills and gullies entering a larger coulee. An estimated 390,000 cubic yards (195,000 tons) of waste were buried within the landfill (SEC Donohue, 1992). Soils at the landfill site are composed primarily of impervious clayey and silty clay materials that contain numerous discontinuous sand and siltysand lenses of varying thickness. Ground water at the Old Minot Landfill is present at shallow depths within the glacial till deposits. The saturated till is not used as a source of potable water due to very low yields and its poor natural water quality. However, the ground water within the till may provide limited recharge to other aquifer systems. It is estimated that 18.6 million gallons of leachate are present within the saturated landfill wastes.

Available data on the contaminants present in the environmental media in and around the Old Minot Landfill include the analysis of ground-water, surface-water, soil, sediment, and air samples collected during the PA/SI and RI sampling programs. In general, contaminants were detected in leachate in the landfill, in landfill gas, in soil located near a leachate seep, in surface water and sediment at the site, and in ground water located immediately adjacent to the landfill. Both the physical and chemical data indicate that significant ground-water contamination has not migrated from the site. However, uncontrolled releases of contaminants at low levels does occur from leachate seeps and landfill gas releases. The following general conclusions were drawn from the previous studies:

- The refuse is covered by a soil cap that is a minimum of 3 feet thick.
- Leachate seeps exist and have adversely impacted soils at the seeps. These lechate seeps may become more pronounced if no action is taken. However, to date, natural surface water bodies have not been impacted by the landfill contamination.
- Site physical conditions have limited ground-water contamination and subsurface gas migration to the immediate vicinity of the landfill.
- Gas emissions from the landfill release volatile organic compounds to the atmosphere.

Specific contaminants detected in individual media and the distribution of contaminants at the Old Minot Landfill Superfund site are briefly discussed below:

1. Ground Water

Investigations of ground-water contaminant migration concluded that contaminant release to ground water beyond the landfill perimeter, and its potential effect on receptors located downgradient, was minimal. Ground-water and leachate sampling indicated that significant concentrations of contaminants were only present in areas in direct contact with the saturated waste.

Contaminants detected in ground water and leachate include: trans 1,2-dichloroethene and vinyl chloride at concentrations up to 1400 and 49 micrograms per liter (ug/l), respectively; benzene, toluene, ethylbenzene, and xylene (BTEX) ranging in maximum concentration from 23 to 180 ug/l; phthalates; and elevated concentrations of metals such as barium, chromium, cobalt, copper, nickel, and zinc. Trichloroethene (TCE) and tetrachloroethane (PCA) were also detected in about 30% of the ground-water samples.

Aroclor 1254 was detected at a concentration of 2.6 ug/l in a composited sample obtained from the leachate wells within the landfill. However, since no PCBs or pesticides were detected in

any of the ground-water samples collected from monitoring wells, it appears that Aroclor 1254 is not migrating from the saturated refuse.

2. Surface Water

Contaminants were also detected in surface water (localized ponding) at the landfill. Phenolic compounds constitute the largest class of contaminants identified in surface water. With a maximum concentration of almost 7,600 ug/l, bis(2-ethylhexyl)phthalate was detected the most often, followed by benzoic acid at an average concentration of 8,500 ug/l. Other phenolics identified in surface-water samples include: 4-methylphenol, di-n-butylphthalate, diethylphthalate, di-n-octylphthalate, and benzyl alcohol. More than half of the samples tested positive for phthalate esters

Acetone was the principal solvent detected in surface-water samples, and exhibited a maximum concentration of 2,700 ug/l. Solvents such as: 2-butanone (270 ug/l), 2-hexanone (10 ug/l), and 4-methyl-2-pentanone, (56 ug/l) were also detected in one surface-water sample. In general, BTEX compounds were not prevalent in surface-water samples, but toluene was detected in nearly one-half the samples at a maximum concentration of 128 ug/l.

Toxic metals such as arsenic, chromium, lead, and nickel were detected in a few surface-water samples at concentrations elevated above background levels. Other metals detected in surface water include low levels of mercury, cobalt, silver, barium, copper, vanadium, and zinc.

3. Soil

Three soil boring samples and four surficial soil samples were analyzed for the presence of organic and inorganic contaminants at the Old Minot Landfill. The highest concentration of contaminants was detected in a sample collected near a leachate seep.

Acetone was detected in two samples, and the highest concentration (1200 micrograms per kilogram (ug/kg) was from a subsurface soil sample collected at the landfill. Phthalate esters were detected in nearly one-half of the soil samples and include: bis(2-ethylhexyl)phthalate, butylbenzylphthalate, di-n-butylphthalate, and diethylphthalate at maximum concentrations ranging from 240 to 550 ug/kg. Other phenolics detected in soil samples were phenol and benzoic acid.

Soil cores were also analyzed for inorganic contaminants and were found to contain such toxic metals as arsenic, chromium, lead, and nickel. The concentrations of these metals were at levels slightly above background. Other metals that were identified are: barium, cobalt, copper, vanadium, and zinc.

4. Sediment

Sediment samples were collected from six locations in and around the landfill site. As with surface-water and soil data, contaminant concentrations decrease significantly with distance from the site, and phenolic compounds were identified consistently in a majority of the sediment samples. Phthalate esters detected in sediment included: bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and diethylphthalate at maximum concentrations ranging from 85 to 590 ug/kg. Phenol (maximum concentration of 540 ug/kg) was detected in 50 percent of the samples.

Polycyclic aromatic hydrocarbons (PAHs) were also detected in several on-site and downstream sediment samples. Carcinogenic PAHs identified in sediment include: benzo[a]pyrene, indeno[1,2,3-cd]pyrene, benz[a]anthracene, bicyclic naphthalene, and tricyclic phenanthrene at maximum concentrations ranging from 100 to 330 ug/kg. Toxic metals such as chromium and lead were detected in all of the samples analyzed, but the highest concentrations were observed in the soil core sample used for background values (8,700 and 17,000 ug/kg, respectively). Other metals detected include: barium, copper, nickel, vanadium, and zinc. In general, inorganic contaminant concentrations in on-site and downstream sediment samples were generally below or essentially the same as background concentrations established from soil core data.

5. Landfill Gases

Ambient and on-site air sampling at the Old Minot Landfill indicated the presence of volatile organic contaminants in landfill gases. During the 1986 air monitoring study, methylene chloride, 1,1,1-trichloroethane, benzene, toluene, tetrachloroethene, and acetone were detected in air samples at concentrations above background levels. The air monitoring results indicated that volatile compounds are being released from the landfill at detectable levels even during periods of strong and gusty winds. However, these results cannot be considered as average annual concentrations due to the extremely short sampling period.

During the RI field effort, volatile organic contaminants belonging to the halogenated aliphatics and the benzene and related compounds classes were detected in landfill gas samples. Halogenated aliphatic compounds such as cis-1,2-dichloroethene and vinyl chloride were detected in all the samples. Vinyl chloride, a known human carcinogen, was detected at an elevated concentration of 13,000 parts per billion (ppb) in one landfill gas sample and dichlorodifluoromethane was detected in four out of five gas samples at a maximum concentration of 3,400 ppb.

BTEX compounds were also detected in most of the landfill gas samples. Toluene was detected in all the samples at a maximum concentration of 6,600 ppb. Maximum concentrations of xylene, ethylbenzene, and benzene in landfill gas were 5,800, 2,800, and 440 ppb, respectively. One sample also indicated the presence of chlorobenzene at a concentration of 1,600 ppb. Other aromatic compounds detected in landfill gas include 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene.

VI. SUMMARY OF SITE RISKS

CERCLA mandates that EPA protect human health and the environment from current and potential future exposures to hazardous substances at the Old Minot Landfill. Therefore, a Baseline Risk Assessment (EPA, 1992) was prepared for the site to evaluate potential human health risks associated with the site in the absence of any remedial action. The results of the risk assessment were used to make decisions about remedial action alternatives. Specific objectives included: document the magnitude and primary causes of risk at the site, provide a basis for comparing potential health impacts associated with remedial alternatives, and provide consistency in evaluating public health threats at Superfund sites.

1. Contaminants and Media of Concern

The selection of chemicals of concern (COCs) for the Old Minot Landfill Superfund site was based on several factors such as regulatory criteria and standards for contaminant chemicals; intrinsic carcinogenic, reproductive, and developmental hazards of identified chemicals; and the environmental mobility, persistence, and prevalence of contaminants in the sampled media.

The COCs identified at the Old Minot Landfill may be classified on the basis of their structural characteristics as: solvents; benzene and benzene-related compounds; halogenated aliphatics; phenol and phenol-related compounds; polycyclic aromatic hydrocarbons (PAHs); and inorganic compounds. Table 1 identifies the specific compounds included for the various types of COCs. Contaminated media that were quantitatively evaluated in the risk assessment are: ground water (including leachate), surface water, soil, sediment, and landfill gases.

2. Exposure Assessment

Residential, commercial, recreational, and agricultural areas are currently located in the vicinity of the landfill, and nearly a quarter (8,000) of Minot's population lies within a one-mile radius of the site. Since the latter part of 1989, burial cell A of the landfill has been enclosed with a chainlink fence and, consequently, public access to the site is presently restricted. Future land use for the areas adjacent to the landfill is expected to be commercial and light industrial (SAIC, 1990). Potentially exposed receptors who were evaluated in the Baseline Risk Assessment are: (1) adult residents and occupational workers who live or work at or in the vicinity of the site, and (2) active children between the ages of 3 to 12 years who live or play in the vicinity of the site.

Reasonable maximum exposure (RME) and most likely exposure (MLE) scenarios for various environmental media have been estimated for the residential and working populations of adults and residential population of children under both current and potential future land-use conditions. RME exposure assumptions were based on the 90th percentile upper-bound confidence limit of the arithmetic mean concentration, and MLE exposure assumptions were derived from the 50th percentile median-bound confidence limits. The RME is the highest exposure that could reasonably be expected to occur at a site. MLE risk estimates were calculated from mean concentrations of contaminants, and in instances where only a single data point was available, the risk estimate calculated was used to assess both RME and MLE exposure scenarios. Carcinogenic and noncarcinogenic risk estimates were calculated for the following RME and MLE scenarios:

- Exposure to ground water used as a potable water source and incidental dermal exposure to ground water while showering.
- Incidental ingestion of surface water and dermal exposure to surface water while swimming or wading in onsite ponds.
- Incidental ingestion and dermal contact with contaminated soil.
- Exposure by incidental dermal contact with sediment while swimming or wading in onsite ponds.
- Exposure to chemical vapors in landfill gases, soil, and surface water.

3. Toxicity Assessment

Toxicological effects from chemical contaminants are diverse and complex. In order to estimate the potential adverse health effects due to exposure to hazardous chemicals, the EPA has provided guidelines for quantitative estimation of carcinogenic and noncarcinogenic risks for virtually all hazardous chemicals detected at the landfill.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg-day)⁻¹, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects a conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. Oral and inhalation exposure route CPFs for chemicals of concern are presented in Table 2.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime (assumed to be 70 years) daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur. Oral and inhalation exposure route RfDs for chemicals of concern are presented in Table 2.

4. Risk Characterization

This section integrates results from the exposure and toxicity assessments in order to quantitatively estimate the potential risks associated with exposure scenarios that have been developed for the Old Minot Landfill. Since no complete exposure pathways were identified for current site use conditions, current risk is estimated to be insignificant. However, land-use changes in the future and/or contaminant migration from the landfill to offsite areas would create the potential for currently incomplete pathways to become complete with associated exposure and risk. Therefore, the results of the risk assessment for both adults and children

are based on potential future exposure scenarios.

Baseline (no action) exposure and risk calculations were performed for all the exposure scenarios. Quantitative methods were used to derive human health risks that could result from chronic exposure to chemicals of concern. Uncertainties with risk estimates could arise from limitations of the site characterization studies and analytical data base. In addition, there are inherent uncertainties in developing the exposure assumptions associated with the hypothetical future land-use scenario, and uncertainty is also associated with the extrapolation method for estimating cancer risk. Although there are uncertainties in the final quantitative risk estimates, conservative assumptions were used to ensure a sufficient degree of human health protection.

Potential health risks to humans are expressed in two ways: noncarcinogenic and carcinogenic. Noncarcinogenic risks are calculated by assuming that there is a dose below which no adverse health effects will occur. Potential concern for non-carcinogenic effects of a single medium is expressed as the hazard quotient (HQ). This value is used to generate the hazard index (HI) by adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. A hazard index of 1.0 or greater suggests that some caution should be exercised, but does not mean that adverse effects will result from exposure.

For carcinogens it is assumed that there is no safe dose, but that the risk of cancer decreases as the dose decreases. Excess lifetime cancer risks represent the probability, over and above the background level, that an individual has of contracting cancer resulting from exposure to carcinogens over a lifetime under specific exposure conditions. In determining the need for remedial action at Superfund sites, EPA guidance states that the total excess lifetime cancer risks for all contaminants must fall within or below the range of one chance in ten thousand ($1.0\text{E-}04$) to one chance in one million ($1.0\text{E-}06$).

In order to express estimated noncarcinogenic hazards and excess lifetime cancer occurrences for the site, the risks for all the pathways under study were combined and are presented by medium in Tables 3 and 4.

Table 3 provides a summary of the combined total hazard indices for noncarcinogenic effects associated with the selected media and exposure pathways. The combined total hazard for ground water including the drinking and dermal exposure pathways is above EPA's risk-based noncarcinogenic action level of 1.0. In the case of landfill gases, however, only the RME combined total hazard index for adults is above the EPA criterion for remedial action.

Table 4 summarizes the excess lifetime cancer risks calculated for various media and exposure pathways. The cancer risk estimates that exceed EPA's guidelines for remedial action are highlighted in bold print.

The greatest potential cancer risk for adults will be from direct inhalation of landfill gases. Under this scenario, the probability for an adult to develop cancer above the national average is about 1 in 100. For a child, the excess cancer risk from landfill gases would be 1 in 5,000. The hypothetical risks associated with this scenario indicate that measures should be considered for minimizing construction on the landfill that would expose people to high concentrations of landfill gas.

Exposure to contaminated ground water presents the second most serious potential excess cancer risk to adults and the most serious excess cancer risk to children. The probability that either an adult or child will develop cancer in excess of background occurrences is about 1 in 300. The hypothetical risk associated with this scenario indicates that measures should be considered for minimizing the potential for ground-water (leachate) flow from the site.

Exposure to contaminated soils is observed to present a relatively lower potential cancer risk for both adults and children. The excess cancer risk for an adult is 1 in 38,000, while the excess cancer risk for a child is about 1 in 77,000.

Direct skin contact with contaminated sediment from leachate seeps and onsite ponds also presents a relatively low potential excess cancer risk for adults as well as children. The

probability that an adult will develop cancer above background occurrences is approximately 1 in 70,000, while the probability that a child will develop cancer in excess of background levels is less than about 1 in 400,000.

Exposure to contaminated surface water presents the lowest potential cancer risk of the scenarios evaluated. The excess cancer risk for an adult is over 1 in 250,000, and the excess cancer risk for a child is only about 1 in 1,400,000.

Based in part on the Baseline Risk Assessment, EPA has determined that actual or threatened releases of hazardous substances from the Old Minot Landfill, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VII. DESCRIPTION OF ALTERNATIVES

1. Alternative 1 - No Action

The Superfund program requires that the "no-action" alternative be considered at every site. Under this alternative, EPA would take no further action to control the source of contamination and the cost would be zero dollars. The No-Action alternative would have no impact on current risk because the Baseline Risk Assessment concluded that currently there are no complete exposure pathways and, therefore, current risk is insignificant. However, potential future land-use scenarios, such as construction on the landfill site, exist that could expose individuals to unacceptable risk. Furthermore, the No Action alternative would not meet Applicable or Relevant and Appropriate Requirements (ARARs) because leachate seeps are not acceptable under current North Dakota landfill design requirement regulations, and ground water within the landfill (leachate) exceeds drinking water Maximum Contaminant Levels (MCLs) for several volatile organic compounds (VOCs).

2. Alternative 2 - Capping, Consolidation of Contaminated Soil Under the Cap, Leachate Extraction and Treatment, Passive Landfill Gas Collection, and Institutional Controls

Alternative 2 incorporates removal, treatment, and containment technologies and could cost between \$1,185,900 and \$2,152,300 to construct. Primary components of Alternative 2 include:

- Institutional controls to prohibit construction on the landfill, or the use of water beneath the landfill and in the immediate vicinity of the landfill for drinking water purposes.
- Leachate extraction to eliminate contaminated groundwater migration from the landfill area.
- Leachate treatment in the City of Minot wastewater treatment facility to levels protective of human health and the environment.
- Consolidation of contaminated soil in the vicinity of leachate seeps under the cap and cap improvements to limit precipitation infiltration and control stormwater runoff.
- Ground-water monitoring to allow detection of future releases of contaminants to the ground water outside the landfill area. Wells and gas probes within the limits of waste will be properly abandoned.
- Landfill gas collection, using a passive trench vent system, to minimize the potential for adverse impacts to the cap due to gas buildup.
- Landfill gas collection, using a passive trench vent system, to manage the gas in a manner protective of human health and the environment.

The passive gas collection system would be constructed after leachate levels are lowered by the leachate collection system. It is expected that leachate levels would be lowered sufficiently within 18 months of start up of the leachate extraction system. If the leachate extraction system does not sufficiently reduce leachate levels, additional wells would be added.

Emission rates from the passive trench vent system would be estimated for sulfur oxides, particulate matter, carbon monoxide, nitrogen dioxide, lead, hydrogen sulfide, and any other pollutant expected. These rates would be included in an Air Pollution Emission Notice (APEN) to be filed with the state prior to the start of construction. Additionally, the APEN would include a modeled impact analysis of source emissions, a Best Available Control Technology (BACT) review, and any other requirements necessary to conform to the State Air Quality Implementation Plan (SIP). The predicted emissions would be compared to the national primary and secondary ambient air quality standards cited in 40 CFR 50 and 61, and the final system would be designed to prevent emissions from exceeding these standards. Monitoring the landfill gas emissions would be performed concurrently with ground-water monitoring to ensure that the predicted emission rates for pollutants are not exceeded. Monitoring for odor would also be performed to satisfy regulatory requirements.

3. Alternative 3 - Capping, Consolidation of Contaminated Soil Under the Cap, Leachate Extraction and Treatment, Active Landfill Gas Collection With Tall Stack Venting, and Institutional Controls

Alternative 3 also incorporates removal, treatment, and containment technologies and could cost between \$1,084,400 and \$2,050,800 to construct. The principal difference is the method of collecting and venting landfill gases. Primary components of alternative 3 include:

- Institutional controls to prohibit construction on the landfill, or the use of water beneath the landfill or in the immediate vicinity of the landfill for drinking water purposes.
- Leachate extraction to eliminate contaminated groundwater migration from the landfill area.
- Leachate treatment in the City of Minot wastewater treatment facility to levels protective of human health and the environment.
- Consolidation of contaminated soil in the vicinity of leachate seeps under the cap and cap improvements to limit precipitation infiltration and control stormwater runoff.
- Ground-water monitoring to allow detection of future releases of contaminants to the ground water. Wells and gas probes within the limits of waste would be properly abandoned.
- Landfill gas collection, using an active collection system and a tall stack for dispersion venting, to minimize the potential for adverse impacts to the cap due to gas buildup. The system can be upgraded to include gas flaring technology, if required in the future.
- Landfill gas collection, using an active collection system and a tall stack for dispersion venting, to minimize human exposure and to manage the gas in a manner protective of human health and the environment.

An active landfill gas collection system, consisting of leachate/gas collection wells and an active gas collection trench along the southeast limits of waste would be installed.

The leachate/gas collection wells would become functional for landfill gas extraction after the leachate level has been lowered to a depth of approximately five feet below the cap. The period of time needed to implement this remedy is expected to range from one to two years, and it is anticipated that remedial action objectives would be achieved in two to three years.

The landfill gas would be extracted with a blower and vented and dispersed by means of an elevated stack. Emission rates from the active gas collection system and tall stack would be estimated for sulfur oxides, particulate matter, carbon monoxide, nitrogen dioxide, lead, hydrogen sulfide, and any other pollutant expected. These rates would be included in an APEN to be filed with the state prior to the start of construction. Additionally, the APEN would include a modeled impact analysis of source emissions, a BACT review, and any other requirements necessary to conform to the SIP. The predicted emissions would be compared to the national

primary and secondary ambient air quality standards cited in 40 CFR 50 and 61, and the final system would be designed to prevent emissions from exceeding these standards. Additionally, the system would be designed to avoid concealing emissions from the landfill and to provide odor-free operation. Monitoring the landfill gas emissions would be performed concurrently with ground-water monitoring to ensure that the predicted emission rates for pollutants are not exceeded. Monitoring for odor would also be performed to satisfy regulatory requirements.

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

As discussed above, site remediation alternatives have been developed that include combinations of removal, treatment, and containment for the Old Minot Landfill Superfund site. In this section, these alternatives are evaluated and compared to each other using the following nine evaluation criteria to identify the alternative providing the best balance among the criteria.

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs
3. Long-Term Effectiveness and Performance
4. Reduction of Toxicity, Mobility, and Volume Through Treatment
5. Short-Term Effectiveness
6. Implementability
7. Cost
8. State Acceptance
9. Community Acceptance

1. Overall Protection of Human Health and the Environment:

This criterion is categorized as a threshold criterion (i.e., alternatives must pass this criterion to remain in the evaluation). This criterion assesses the protection afforded by each alternative considering the long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. Protection of human health is assessed by evaluating how site risks from each exposure route are eliminated, reduced, or controlled through the specific alternative. This evaluation will take into account short-term or cross-media impacts that result from implementation of the alternative remedial activity.

Alternatives 2 and 3 are protective and are nearly equal in the level of protectiveness. Both alternatives will limit exposure to contaminated ground water through: institutional controls to prohibit use of water beneath the landfill or in the immediate vicinity of the landfill for drinking water purposes; leachate extraction to eliminate contaminated groundwater migration from the landfill area; treatment of leachate to water quality levels protective of human health and the environment; ground-water monitoring to allow for detection of future releases of contaminants to the ground water. Each of the alternatives will also limit exposure to contaminated soils by requiring that the soils be consolidated under the cap.

Alternatives 2 and 3 will each employ a landfill gas collection system to minimize uncontrolled exposures to humans. Alternative 3 is more protective because the tall stack vent will disperse landfill gas contaminants, further limiting exposure to the gas. In contrast, Alternative 2 allows the landfill gas to discharge to the atmosphere without designed dispersion. Alternative 3 would also reduce the potential for landfill odors to nearby residents.

Alternative 1, No Action, does not satisfy the requirement for overall protection of human health and the environment. Under the No Action alternative, leachate seeps would continue and high leachate heads in the landfill might encourage migration of contaminants from the landfill in the future. Furthermore, the absence of land use controls may result in future development of the landfill, as well as the installation of groundwater supply wells that might intercept leachate.

2. Compliance with ARARs:

This criterion is also a threshold criterion in that all alternatives must achieve compliance with ARARs to be considered as site remedies or, if compliance is not achieved, a justifiable ARAR waiver must be obtained. Section 121(d) of the Superfund Amendments and Reauthorization Act (SARA) mandates that for all remedial actions conducted under CERCLA, cleanup activities must be conducted in a manner that complies with ARARs. The National Oil and Hazardous

Substances Pollution Contingency Plan (NCP) and SARA have defined both applicable requirements and relevant and appropriate requirements as follows:

- Applicable requirements are those federal and state requirements that would be legally applicable, either directly or as incorporated by a federally authorized state program.
- Relevant and appropriate requirements are those federal and state requirements that, while not legally "applicable," are designed to apply to problems sufficiently similar to those encountered at CERCLA sites that their application is appropriate. Requirements may be relevant and appropriate if they would otherwise be "applicable," except for jurisdictional restrictions associated with the requirement.
- Other requirements to be considered are federal and state non-regulatory requirements, such as guidance documents or criteria. Advisories or guidance documents do not have the status of potential ARARs. However, where there are no specific ARARs for a chemical or situation, or where such ARARs are not sufficient to be protective, guidance or advisories should be identified and used to ensure that a remedy is protective.

Federal and state ARARs which must be considered include those that are: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs govern the extent of site cleanup in terms of actual cleanup levels. Maximum contaminant levels (MCLs) which must be met or maintained are chemical-specific ARARs. Location-specific ARARs govern natural site features such as wetlands, floodplains, and man-made features such as existing landfill and disposal areas. Action-specific ARARs are technology or activity-based requirements that set restrictions on particular kinds of action at CERCLA sites.

Compliance with these requirements was evaluated for each alternative. For alternatives which do not comply with the requirements, justification for a waiver under CERCLA is discussed.

Alternatives 2 and 3 will achieve compliance with Safe Drinking Water Act (SDWA) MCL requirements. Leachate extraction will limit contaminant migration and ensure that SDWA MCLs will not be exceeded for ground water in the immediate vicinity of the landfill. Treatment of leachate in the City of Minot wastewater treatment facility, with no pre-treatment, will meet SDWA MCLs and National Pollution Discharge Elimination System (NPDES) requirements.

In the event that additional gas management becomes necessary to protect human health and the environment, Alternative 3 could be modified to incorporate gas flaring or other technologies.

Alternatives 2 and 3 meet the substantive requirements of the State's Solid Waste Regulation, with the exception of cap permeability. Clay soils near the site can only be recompacted to a permeability slightly greater than the State standard of $1.0E-07$ cm/sec. However, the combination of landfill capping and leachate extraction meet the requirements of Section 121(d)(4) of CERCLA for a waiver from an ARAR since an equivalent standard of performance will be attained through use of another method or approach.

Alternative 1 will not satisfy SDWA MCLs for ground water within the landfill. This alternative will also not satisfy SDWA MCLs for ground water outside the landfill perimeter, if there is future contaminant migration.

The next five criteria are designated as balancing criteria. These criteria are used to measure the positive and negative aspects of performance, implementability, and cost for each alternative.

3. Long-Term Effectiveness and Permanence:

The focus of this evaluation is to determine the effectiveness of each alternative with respect to the risk posed by treatment of residuals and/or untreated wastes after the cleanup criteria have been achieved. Several components were addressed in making the determinations, including:

- Magnitude of residual risk from the alternative.
- Likelihood that the alternative will meet process efficiencies and performance specifications.
- Adequacy and reliability of long-term management controls providing continued protection from residuals.
- Associated risks in the event the technology or permanent facilities must be replaced.

Alternatives 2 and 3 provide nearly equal long-term effectiveness and permanence. Alternative 3, which includes dispersion of landfill gas by discharge of collected gas through a tall stack, is more effective because of the dispersion of the contaminants in the landfill gas.

The adequacy and reliability of controls for the operation of the remedy are equal in Alternatives 2 and 3. Alternative 3 is more complicated because additional maintenance would be required to assure performance of the active gas collection system blower.

Both Alternatives 2 and 3 require and include ground-water monitoring for evaluation of the long-term effectiveness of the remedy.

Alternative 1, No Action, provides no long-term protection or effectiveness and could result in elevation of risk levels beyond the acceptable risk range identified in the NCP.

4. Reduction of Toxicity, Mobility, and Volume Through Treatment:

This criterion evaluates the ability of the alternatives to significantly achieve reduction of the toxicity, mobility, or volume of the contaminants or wastes at the site, through treatment. The criterion is a principal statutory requirement of CERCLA. This analysis evaluates the quantity of contaminants treated and destroyed, the degree of expected reduction in toxicity, mobility, or volume measured as a percentage or reduction, the degree to which the treatment will be irreversible, the type and quantity of residuals produced, and the manner in which the potential threat will be addressed through treatment. The risk posed by residuals will be considered in determining the adequacy of reduced toxicity and mobility achieved by each alternative.

Alternatives 2 and 3 both reduce the volume of leachate and therefore provide control over mobility of leachate constituents in leachate seepsand in the ground-water system. Both Alternatives 2 and 3 involve treatment of leachate in the City of Minot wastewater treatment facility. This treatment is irreversible and both Alternatives 2 and 3 are affected to the same extent. Wastes at the site would not be treated under either of these alternatives but would be isolated from potential receptors through containment, thereby reducing the mobility of the waste. Alternative 3 could also provide additional treatment, if necessary, of landfill gas discharges by means of a gas flaring system, which is not possible with Alternative 2.

The No Action alternative provides no reduction in toxicity, mobility, or volume.

5. Short-Term Effectiveness:

The short-term effectiveness of each alternative was assessed based on the risk associated with the implementation of the remedial action to the community, workers, and environment and the time required to achieve the response objectives. Measures to mitigate releases and provide protection are a key issue in this determination.

Alternatives 2 and 3 both involve excavation for installation of leachate extraction wells and a gas extraction system. Workers could be easily protected for both alternatives through implementation of appropriate health and safety and contingency planning. Alternative 2 could require Level B health and safety standards for construction of the deep passive vents while Alternative 3 is likely only to require Level C for construction of the extraction wells. Risks to the community during implementation of the alternatives are expected to be minimal since the site is fenced and access will be controlled.

For both Alternatives 2 and 3, the time required until the Remedial Action Objectives are met is the same. It is anticipated that two to three years would be required to draw the leachate head levels down to the levels established in the Remedial Action Objectives. The other Remedial Action Objectives would be met immediately following completion of the installation of the cap and gas extraction system. Alternative 1, No Action, is not effective in the short-term.

6. Implementability:

This criterion analyzes technical feasibility, administrative feasibility, and the availability of services and materials. Technical feasibility assesses the difficulty of construction or operation of a particular alternative and unknowns associated with process technologies. The reliability of the technologies based on the likelihood of technical problems that would lead to project delays is critical in this determination. The ability to monitor the effectiveness of the alternative is also considered.

Administrative feasibility assesses the ease or difficulty of obtaining permits or rights-of-way for construction. Availability of services and materials evaluates the need for off-site treatment, storage, or disposal services, and the availability of such services. Necessary equipment, specialists, and additional resources were also evaluated in determining the ease by which these needs could be fulfilled.

Alternatives 2 and 3 have nearly equal implementability factors. Both use proven existing technologies and the permits and regulatory requirements associated with implementation of the technologies are identical. Also, it has been determined that for either alternative, the City of Minot wastewater treatment facility has the capacity to accept leachate from the landfill. In addition, there are sufficient quantities of locally available clay soil for the specified cap repair requirements discussed in either Alternative 2 or Alternative 3.

There may be some difficulties with implementing institutional controls because the City of Minot does not own the entire site. Although the City has had no difficulty in obtaining access to conduct field investigations and to implement the removal action, property rights issues may make long-term enforcement of deed restrictions and other institutional controls more difficult. Alternative 3 would be more difficult to implement because of the additional mechanical complexity of operating a blower.

7. Cost:

Alternatives are evaluated for cost in terms of capital costs, annual or operation and maintenance costs (O&M), and present worth cost. Capital costs include the sum of the direct capital costs (materials, equipment, labor, land purchases) and indirect capital costs (engineering, licenses, or permits). Annual costs include the cost for labor, operation and maintenance, materials, energy, equipment replacement, disposal, and sampling to operate the treatment facilities. Present worth costs include capital costs and O&M costs calculated over a 50-year period.

The present worth analysis is used to evaluate expenditures that would occur over an assumed 50-year operation period by discounting all future costs to a common base year. This allows the cost of remedial action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial alternatives over its planned life.

Assumptions were made for each of the proposed remedy components to allow each alternative to be analyzed and compared. These assumptions, such as the amount of additional clay material which will be necessary to effect an adequate cap, were based on engineering judgment and characterization studies performed during the RI. The assumptions, and consequently the cost estimates, will be revised as remedial design activities proceed and a more detailed design is developed.

The cost analysis was bifurcated to acknowledge two possible scenarios. The first scenario is based on the assumption that the City of Minot would implement appropriate portions of the remedial action using city-owned fill material, labor, equipment, and/or locally contracted labor. A detailed cost estimate for this scenario may be found in the FS and is represented by the lower cost estimates. Costs for this scenario are based on unit cost estimates provided by

the City.

The second scenario assumes that the remedial action would be implemented by either EPA or a private party other than the City of Minot. Detailed cost estimates for this scenario may also be found in the FS. For either this scenario or the City of Minot scenario, the remedy components will be protective of human health and the environment.

Under either scenario, remedial design efforts may reveal that it is possible to significantly reduce the original project cost estimates. Reductions in the estimated costs could be the result of value engineering conducted during the remedial design. Through the value engineering process, modifications could be made to functional specifications of the remedy to optimize performance and minimize costs. These changes would fall within the definition of "non-significant modifications," as defined by EPA guidance for preparing superfund decision documents.

For example, it may be determined that a reduction in costs could be effected by non-significant changes to the type, quantity, and/or cost of materials, equipment, facilities, services, and supplies used to implement the remedy. It should be noted that this type of design variance may have a noticeable impact on the estimated cost of the remedy, but will not affect the remedy's ability to comply with performance standards.

For the scenario in which it is assumed that the City of Minot will finance the cleanup activities, capital and present worth costs are currently estimated to be as follows.

Alternative 2:

Capital Costs	\$1,185,900
Present Worth Costs	\$1,555,100

Alternative 3:

Capital Costs	\$1,084,400
Present Worth Costs	\$1,531,500

Again, reductions in these estimated costs may occur as the result of value engineering conducted during the remedial design.

The second scenario assumes that the remedial action would be implemented by either EPA or a private party other than the City of Minot. These estimates are described in greater detail in the FS.

Alternative 2:

Capital Costs	\$2,152,300
Present Worth Costs	\$2,561,400

Alternative 3:

Capital Costs	\$2,050,800
Present Worth Costs	\$2,537,800

Capital costs for each alternative, under either scenario, are similar. Alternative 2 is more expensive than Alternative 3 because of the costs associated with the construction of the passive gas collection system. The difference in the present worth costs is also attributed to the costs of material and construction for the passive gas system. While construction of the passive gas system (Alternative 2) would be more expensive than the construction of the active gas collection system (Alternative 3), there are significant operation and maintenance costs for the active landfill gas collection system in Alternative 3.

8. State Acceptance:

This modifying criterion evaluates the technical and administrative issues that have been raised by the State of North Dakota. The State of North Dakota was provided the opportunity to review and comment on: RI/FS documents; the remedial investigation and feasibility study reports; and the draft Proposed Plan. In addition, the State submitted comments on the Proposed Plan during the public comment period, which began on January 4, 1993 and concluded on March 4, 1993.

In accordance with the requirements of the NCP, the State of North Dakota was also provided the opportunity to review and comment on the Record of Decision. As a result of that review, the State of North Dakota chose to concur with the selected remedy. Comments from the State, as well as EPA's responses to those comments, are provided in the Responsiveness Summary (Appendix B).

9. Community Acceptance:

This modifying criterion evaluates comments and concerns, on the Proposed Plan, received from members of the community. The public comment period for the Proposed Plan began on January 4, 1993 and concluded on March 4, 1993. A public meeting was held on January 19, 1993, in Minot, North Dakota. Although no written comments were received from the general public, written comments were received from local and state governmental entities, Minot area business organizations, several potentially responsible parties (PRPs), and all members of the North Dakota Congressional delegation.

All the written comments that were received by EPA were in support of the City of Minot's proposal/comments on the Proposed Plan. In principle, the City's proposal was found to be consistent with the preferred alternative that was proposed by EPA. A summary of (a) the City's proposal, (b) all other written comments, and (c) EPA's responses to those comments, may be found in the Responsiveness Summary (Appendix B). The Responsiveness Summary also includes EPA's answers to the questions/comments that were posed during the public meeting.

IX. SELECTED REMEDY

Based on consideration of the requirements of CERCLA, the detailed analysis of alternatives, and public comments, both EPA and the State of North Dakota have determined that Alternative 3: capping, consolidation of contaminated soil under the cap, leachate extraction and treatment, active landfill gas collection with tall stack venting, and institutional controls is the most appropriate remedy for the Old Minot Landfill in Minot, North Dakota.

The selected remedy incorporates removal, treatment, and containment technologies. Primary components of the remedy and their impact on remediation goals are discussed below. Estimated costs for the components of the selected remedy are provided in Tables 5 and 6. Table 5 lists costs that may be expected by assuming that the City of Minot will construct the remedy using city employees or locally contracted labor, and city-owned fill material for capping and grading. Table 6 lists estimated costs for the remedy components under the scenario in which a private party would be performing the cleanup.

1. Leachate Extraction and Treatment in the City of Minot Wastewater Treatment Plant

Leachate will be extracted from leachate extraction wells. The leachate from each well will be pumped to a common header pipe which will be discharged to the City of Minot sewer system and conveyed to the municipal wastewater treatment facility for treatment.

The reduction in leachate head afforded by the extraction system will eliminate seeps and reduce leachate pressure that might cause future leachate migration to the ground-water system. Leachate will be pumped continuously to maintain a leachate level of approximately 5 feet below the cap.

2. Landfill Gas Collection

An active landfill gas collection system will be installed, and the gas will be drawn off by means of a blower and subsequently vented and dispersed through a tall stack. The leachate/gas collection wells will become functional for landfill gas extraction after the leachate level has

been lowered to a depth of approximately five feet below the cap. The period of time needed to implement this remedy is expected to range from one to two years, depending on the time required to sufficiently lower the leachate level in the landfill. It is anticipated that site remediation goals will be attained with this remedy within a period of two to three years.

3. Consolidation of Contaminated Soil Under the Cap

Soil in the vicinity of landfill seeps will be scraped to a depth of approximately 3 feet and consolidated under the landfill cap. The contaminated soils in the vicinity of the landfill seeps are generally on the existing landfill cap; therefore, this consolidation operation can be accomplished at the same time that cap modifications are being constructed.

4. Landfill Capping

The landfill cap will be reconstructed in order to provide more effective surface water control, repair cap damage in the area of the landfill seeps, and comply with the substantive requirements of federal and state landfill regulations regarding final cover design. The new capping system will consist of, in part, a perimeter diversion berm which will prevent runoff outside the landfill limits from flowing onto the landfill cap, as required by federal and state ARARs. The berm will also stabilize the limits of the waste. The new capping system will incorporate a surface water runoff sedimentation basin to collect sediments from the landfill cap and perimeter ditches.

The cap itself will be constructed by scarifying and recompact the existing cover soils when existing grades are close to proposed grades and when existing materials meet design cap requirements. In all other cases, additional material will be brought in to raise existing grades, meet design requirements, or both. Erosion control matting will be placed where necessary to establish and maintain a vegetative cover. A vegetative cover will be established over all disturbed areas including the site berm, sedimentation basin, and landfill cover.

5. Institutional Controls

The selected remedy includes institutional controls to prohibit future land use developments at the landfill that would cause unacceptable exposure to landfill contents or gas. The institutional controls include prohibition on land use that would damage the cap and prohibition against the installation of ground-water supply wells through the landfill or in the immediate vicinity of the landfill. The institutional controls will be effective indefinitely. Implementation of institutional controls will require agreements with landowners of the landfill site as well as those adjacent to the site.

6. Monitoring

Ground-water monitoring will continue during and following implementation of the remedial action in order to document that the source control remedy is adequate over the long-term to maintain ground water outside of the landfill at acceptable quality levels. The monitoring wells installed during the Remedial Investigation will be used in the long-term ground-water monitoring program. Monitoring wells installed in the landfill itself, along with previously installed gas wells, will be abandoned during implementation of the selected remedy.

The monitoring program will begin with four quarterly sampling events the first year and continue with annual sampling and analysis of the groundwater samples from the monitoring wells. Sampling and analysis will be done for VOCs and inorganic and organic chemicals that have maximum contaminant levels (MCLs) cited in 40 CFR 141.11 and 12, and 40 CFR 141.60 and 61; maximum contaminant level goals (MCLGs) cited in 40 CFR 141.50; or secondary maximum contaminant levels (SMCLs) cited in 40 CFR 143.03. The four quarterly sampling events will determine the baseline ground-water quality. After that, annual monitoring is recommended since the ground-water flow rate in the geologic materials in the vicinity of the landfill is low. Annual monitoring will be adequate to identify any changes in ground-water quality in the immediate vicinity of the landfill.

Routine monitoring will also be required for the leachate that is discharged to the Minot wastewater treatment facility. Monitoring requirements will include the analysis of monthly grab samples for chemical oxygen demand (COD), biochemical oxygen demand (BOD₀), total suspended

solids, and pH, as well as the analysis of quarterly grab samples for VOCs, metals, and chemicals that have MCLs, MCLGs, or secondary maximum contaminant levels (SMCLs). One toxicity screening test will also be performed prior to initial discharge.

The required range of analytical parameters for the ground water and leachate monitoring programs may be reviewed on an annual basis and may be modified, as appropriate and only after approval from EPA. These modifications will be based upon trends that will be established from the accumulated results of the previous sampling events.

Remediation Goals and Performance Standards

Remediation goals for protecting human health and the environment are based on risk-related considerations such as cleaning-up media to reduce intake of contaminants or isolating the contaminated media to eliminate the exposure pathway and to comply with all applicable or relevant and appropriate requirements. Existing site conditions, evaluated within the context of current land use and access restrictions, do not present an unacceptable risk. However, future changes in land use or site activities could expose humans to greater than acceptable risk. The primary purpose of this response action is to control or mitigate unacceptable potential future risks posed by the direct inhalation of landfill gases and contact with or ingestion of ground water contaminated by leachate.

Performance standards are those standards which the remedy shall achieve in order to satisfy the remediation goals. Additional performance standards information may be found under Section VIII, Item 2 of this document and in Appendix A. Measurement protocols for determining compliance with the remediation goals and performance standards will be developed during the remedial design.

Remediation Goals

- (1) Prevent direct contact with the landfill contents including the solid waste, leachate, and gas.
- (2) manage leachate: to limit future leachate migration out of the landfill to ensure a low risk to potential ground water receptors; and to maintain groundwater quality outside the landfill within drinking-water standards.
- (3) treat or isolate soils in the immediate vicinity of leachate seeps to prevent contact or ingestion that would result in unacceptable carcinogenic or noncarcinogenic risks.
- (4) control leachate seeps to prevent the movement of contaminants by surface flow to off-site soil and surface water.
- (5) manage landfill gas to ensure a low risk to air receptors.
- (6) manage landfill gas to reduce gas pressure within the landfill in order to protect the cap.

Performance Standards

- (1) Minimum three-foot clay cap over landfill, consistent with substantive requirements of North Dakota Solid Waste Management Act and pertinent federal Solid Waste Land Disposal requirements [40 CFR Parts 241 and 257] and Surface Water Control requirements [40 CFR Part 264].
- (2) Water quality standards in accordance with SDWA [40 CFR Parts 141 and 143] and NPDES [40 CFR Parts 125, 136, and 403] requirements. Groundwater adjacent to the landfill shall not contain contaminants at levels that cause the ground water to exceed the 1.0E-04 to 1.0E-06 risk range for carcinogens, or the hazard index to exceed 1 for noncarcinogens for potential receptors located adjacent to the landfill.
- (3) Contaminated soils shall be removed to a depth of approximately three feet and consolidated under the landfill cap, consistent with substantive requirements of North Dakota Solid Waste Management Act and pertinent federal Solid Waste Land Disposal requirements [40 CFR Parts 241 and 257].
- (4) Landfill cap shall be reconstructed in accordance with substantive requirements of North Dakota Solid Waste Management Act and pertinent federal Solid Waste Land Disposal requirements [40 CFR Parts 241 and 257] and Surface Water Control requirements [40 CFR Part 264].
- (5) Air quality standards in accordance with pertinent requirements of 40 CFR Part 6, Subpart C, Parts 50, 52, 61, and 241, the North Dakota Solid Waste Management Act, and the North Dakota Air Pollution Control Regulations. Air, at or near the landfill surface, shall not contain contaminants at levels that cause the air to exceed the 1.0E-04 to 1.0E-06 risk range for carcinogens, or the hazard index to exceed 1 for noncarcinogens for potential receptors located adjacent to the landfill.
- (6) Pertinent requirements of the North Dakota Solid Waste Management Act and federal Solid Waste Land Disposal requirements [40 CFR Parts 241 and 257].

(7) manage landfill gas to reduce pressure head buildup of leachate on the landfill base to minimize leachate migration to ground water.

(8) manage leachate to prevent exceedances of water quality standards in natural surface waters due to stormwater runoff from the site or discharge from a treatment facility.

(7) Pertinent requirements of the North Dakota Solid Waste Management Act and federal Solid Waste Land Disposal requirements [40 CFR Parts 241 and 257].

(8) Water quality standards in accordance with SDWA [40 CFR Parts 141 and 143] and NPDES [40 CFR Parts 125, 136, and 403] requirements, Standards of Water Quality for the State of North Dakota, and North Dakota Pollutant Discharge Elimination System regulations.

X. STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for a site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy must also be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatments that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following discussion addresses how the selected remedy meets these statutory requirements.

1. Protection of Human Health and the Environment

The selected remedy will protect both human health and the environment. The leachate extraction and treatment system will minimize the potential for any future off-site migration of landfill leachate into the groundwater system. The landfill gas collection system will reduce landfill gas pressure which should reduce stress on the cap and the pressures within the landfill that might encourage future outflow of leachate into the ground-water system. Cap improvements will eliminate the possible exposure of receptors to leachate and landfill waste. Institutional controls will prohibit future land uses that could damage the in-place remedial action. Finally, ground-water monitoring will assure that there is early warning of any future failure of the remedy.

2. Compliance with ARARs

The selected remedy of capping, consolidation of contaminated soil under the cap, leachate extraction and treatment, active landfill gas collection with tall stack venting, and institutional controls will substantively comply with all applicable or relevant and appropriate chemical- and action-specific requirements (ARARs). No location-specific ARARs are identified for the site. Federal and state statutes and regulations pertinent to the selected remedy are presented below.

Federal:

- Clean Air Act (CAA)
- Clean Water Act (CWA)
- Safe Drinking Water Act (SDWA)
- Resource Conservation and Recovery Act (RCRA; Non Hazardous Waste Subtitles)
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

State:

- North Dakota Solid Waste Management Act
- North Dakota Pollutant Discharge Elimination System (NPDES) Regulations
- Standards of Water Quality for the State of North Dakota
- North Dakota Air Pollution Control Regulations

Specific federal ARARs pertinent to the selected remedy are presented in the remedy compliance analysis in Table A-1 of Appendix A. Specific state ARARs, with which the selected remedy may be required to comply, are evaluated in Table A-2 of Appendix A.

The selected remedy has provisions for landfill gas dispersion following venting from the landfill. The component of the remedy that addresses discharge of landfill gas could be affected by future changes in the Clean Air Act regulations or state regulations affecting landfill gas emissions. Without treatment, the landfill gas emissions will result in a release of less than 1 pound per day of total VOCs to the atmosphere. This emission rate is less than anticipated future control requirements.

The landfill materials are not classified as a hazardous waste; therefore, only the provisions of the Resource Conservation and Recovery Act that relate to non-hazardous municipal waste will apply. The design of the remedy will meet the substantive provisions of these requirements. Specific requirements are incorporated in and controlled by the State Solid Waste Regulations.

The Clean Water Act regulations apply to the treatment of the leachate in the City of Minot wastewater treatment facility and the subsequent impact on the Souris River downstream of the facility's discharge point. Treatment of leachate in the City of Minot wastewater treatment facility will meet all of the provisions of the Clean Water Act as discussed in the City's NPDES Permit. Pretreatment of leachate, prior to treatment in the wastewater treatment plant is not required now, but may be required in the future if CWA regulations change.

The primary state ARARs controlling the remedy are the State's Solid Waste Regulations. The remedy meets the substantive requirements of these regulations with the exception of cap permeability. Clay soils in the vicinity of the Old Minot Landfill can be recompacted to a permeability of slightly greater than 1×10^{-7} cm/sec. The state standard for permeability is 1×10^{-7} cm/sec. However, engineering analysis of the cap indicates that there will be no significant increase in average precipitation inflow through the cap, given the minor deviation from the permeability requirement. Furthermore, the leachate extraction system will be in place and will be able to maintain leachate levels regardless of minor variations in cap permeability. Therefore, the combination of the landfill cap and leachate extraction system meet the requirements of Section 121(d)(4) of CERCLA for a waiver from an ARAR. The specific ARAR waiver is "An alternative remedial action will attain an equivalent standard of performance through the use of another method or approach." This waiver will be invoked if EPA determines that areas of the existing cover are sufficiently thick and compact so as to make placing six inches of topsoil and repairing erosion rills sufficient to decrease infiltration to levels which, in turn, can be controlled by the leachate extraction system.

3. Cost Effectiveness

The selected remedy has been determined to provide overall effectiveness proportional to its costs and is therefore considered cost effective. The net present worth value ranges from \$1,531,500 to \$2,537,800 and reflects the differences between overall project costs assuming the City of Minot does the work with city-owned materials and city employees or locally contracted labor, and project costs for a private party other than the City. The estimated costs of the selected remedy are slightly less than the costs associated with the similar alternative developed that uses a passive gas venting system, yet the selected remedy provides a higher degree of protectiveness due to dispersion of gases through a tall stack. All of the technologies included in the remedy are readily implementable and have been widely used and demonstrated to be effective. In addition, the selected remedy can be upgraded to include gas flaring technology if necessary to provide additional protection to human health and the environment.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

EPA and the State of North Dakota have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the Old Minot Landfill Superfund site. Of the alternatives that are protective of human health and the environment and comply with ARARs, EPA and the State have determined that this selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness; implementability; cost; and the statutory preference for treatment as a principal element.

The selected remedy is expected to be permanent and effective over the long-term as long as routine maintenance on the cap, leachate extraction system, and gas system is performed. The remedy is expected to eliminate leachate surface seeps and to permanently minimize migration of leachate to the surrounding ground-water system. The present outflow of leachate to the ground-water system is believed to be relatively minor, and the added design features of leachate head-level maintenance and capping will add a safety factor to the current landfill contaminant migration controls.

There will be a reduction in volume through treatment because the leachate will be extracted from the landfill to reduce the long-term leachate levels, and the leachate will be treated in the City of Minot wastewater treatment facility. There are no special requirements for the treatment process and the treatment is irreversible.

5. Preference for Treatment as a Principal Element

The selected remedy is protective of human health and the environment, substantively complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. A waiver from the North Dakota standard for landfill cap permeability is justified under the requirements of Section 121(d)(4) of CERCLA since the combination of landfill capping and leachate extraction will attain an equivalent standard of performance through the use of another method or approach. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this site. There are no principal threats at the site. However, this remedy satisfies the statutory preference for treatment as a principal element of the remedy through treatment of the leachate. The size of the landfill and the fact that there are no on-site hot spots that represent the major sources of contamination preclude a remedy in which contaminants could be excavated and treated effectively.

APPENDIX A

Table A-1 Pertinent Federal ARARs and Compliance Analysis

Table A-2 Documentation of State ARARs

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

APPENDIX B

OLD MINOT LANDFILL, MINOT, NORTH DAKOTA RESPONSIVENESS SUMMARY

1. OVERVIEW

The U.S. Environmental Protection Agency (EPA) established a public comment period from January 4, 1993 through March 4, 1993 for interested parties to comment on the Remedial Investigation/Feasibility Study (RI/FS) reports and the Proposed Plan for the Old Minot Landfill Superfund site in Minot, North Dakota. EPA also held a public meeting at 7:00 p.m. on January 19, 1993 at the Minot City Hall to outline the proposed remedy for controlling and preventing landfill gas emissions and contaminant migration from the site.

The Responsiveness Summary, required by Superfund law, provides a summary of comments received from the community during the public comment period, as well as EPA's responses to public concerns. All comments received during the public comment period were considered in EPA's final selection of a remedial alternative for the Old Minot Landfill.

This Responsiveness Summary is organized into the following sections:

- Background on Community Involvement
- Summary of Comments Received During the Public Comment Period and EPA Responses

2. BACKGROUND ON COMMUNITY INVOLVEMENT

The site was brought to the attention of the North Dakota State Department of Health (NDS DH) by a citizen's complaint in 1985. A public meeting was held, concerning the landfill, by the City of Minot in January of 1990. An EPA community involvement coordinator conducted interviews of Minot citizens during the week of September 25, 1990. Twelve citizens were interviewed as well as the City Manager and Assistant Public Works Director. Some of the citizens interviewed were business people, City Council members, the mayor, and interested residents. The interviews took place at the business locations of the persons interviewed and at the Minot City Hall. The following comments were compiled from the EPA interviews. Attitudes Toward EPA

The majority of interviewees expressed frustration with EPA and the Superfund program. Their concerns were primarily economic. They also expressed resentment toward the intrusion of outsiders into their local affairs and generally did not understand how or why their municipal landfill became involved in the Superfund program. There was a perception that the Old Minot Landfill was selected as a Superfund site simply because the EPA is obligated to spend Superfund money in every state.

Residents felt that the EPA had lost credibility under certain circumstances and appeared to be indecisive. They also felt that there needed to be a separate policy for municipal landfills as they relate to the Superfund process. It appeared to them that municipalities, which run their own landfills, are at a disadvantage over those who contract out the waste collection and are penalized for having provided good service.

Interviewees were aware that the site had been listed on the National Priorities List (NPL). One said he thought the situation had been well publicized. Another complained that his only source of information was the newspaper.

Economic Issues

The majority of interviewees felt that the Superfund process was inefficient and required unnecessary studies. One individual stated that too much money was being spent on the studies rather than the cleanup. A City of Minot official stated that Minot could clean up the site much more inexpensively if the Superfund process would not "interfere."

Several interviewees felt too much time and money were spent to do the potentially responsible party (PRP) search. They thought it was pointless; one said that it would be impossible to prove who put what wastes in the landfill, and another mentioned that household waste can also

contain hazardous substances.

Some felt that the cleanup was a community problem and should be funded by some kind of taxing mechanism. They thought that it was unfair to charge businesses. The interviewees generally felt that the Superfund cost recovery system was not equitable. They argued that the businesses and the City of Minot operated the landfill in a way that was lawful in the past, and did not consider it fair to hold them responsible now. Businesses in the area were already hurting and the interviewees stated that the community feared losing businesses more than paying taxes.

On the other hand, people noted that the area was losing population and that the economy was depressed, suggesting that there were fewer individuals paying more taxes. One interviewee stated that EPA should at least pay for its own oversight. Another resident was concerned that the bank would have a hard time selling land adjacent to the site, and the site itself, now that it was on the NPL.

Environmental Impacts

The interviewees were generally uncertain of the actual environmental problems caused by the landfill. They wondered how the site had ranked on the NPL and how their landfill was different from any other small city's municipal landfill. A few were concerned that wells may be contaminated and that there was a danger of a methane fire. One person noted that it had been an error to locate the landfill in a drainage above the river. Others asked why a cleanup was necessary, saying that there were no families dependent on private wells for drinking water, all waters in the area "test okay," and the river, downstream of the landfill, was clean. One interviewee said the city water treatment plant was adequate.

There is a feeling of responsibility to protect the water and a willingness to do so if it is really necessary. One interviewee remarked that in general the people of the area "look after" the land, because as an agricultural community they are dependent on it. One person expressed approval of someone (EPA) looking after the area's concerns. Several officials stated that the city is committed to protecting the water.

Enforcement Actions

Two people felt that there had not been enough support from the state health department with regard to setting guidelines for managing municipal landfills many years ago. They also felt the need for a county health department which could check areas such as landfills before they become a problem.

Summary

The community is concerned with the cleanup primarily from an economic standpoint. The citizens and officials generally want to clean up the site if a problem exists. The community is also concerned about the efficiency of the EPA and the fairness of the Superfund cost recovery process.

EPA Response: Due to general concern that the EPA is spending the community's money on unnecessary activities, the Community Relations Program developed for the site was the minimum permissible under law and EPA policy. While minimizing costs, the Community Relations Program is improving the community's understanding of the data and the potential hazards concerning the site, as well as the Superfund process.

Since municipal landfills often have similar characteristics and, consequently, lend themselves to similar remediation technologies, EPA has developed new guidelines designed for streamlining the RI/FS and remedy selection process at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Municipal Landfill sites. This streamlined approach was adopted in conducting the RI/FS at the Old Minot Landfill. Use of the new guidelines helped to expedite the RI/FS and focus the remedy selection on proven and widely used technologies, which ultimately resulted in a more efficient use of time and resources. By streamlining the RI/FS process EPA: (1) improves the efficiency and effectiveness of decision making at these sites; (2) provides consistency among the Regions in their approach to conducting an RI/FS and selecting a remedy; and (3) facilitates more effective remedial designs.

The community has been kept informed of ongoing activities conducted at the Old Minot Landfill site through mailings, newspaper announcements, and a public meeting. In addition, EPA has established an information repository at the Minot Public Library where materials relevant to the community's concerns and interests may be reviewed. Documents stored at the repository include:

- The RI/FS reports and related documents.
- The Baseline Risk Assessment (BRA).
- A Fact Sheet, summarizing the results of the risk assessment.
- The Proposed Plan.
- Transcript of public meeting on the Proposed Plan (January 19, 1993).

3. SUMMARY OF PUBLIC COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD AND EPA RESPONSES TO COMMENTS

Comments and questions raised during the Old Minot Landfill public comment period on the RI/FS reports and proposed plan are summarized below. The comment period was held from January 4, 1993 to March 4, 1993. The comments are categorized by relevant topics.

Technical Design of the Site Remedy

- The North Dakota State Department of Health (NDS DH) indicated that it would support waiving the 1×10^{-7} cm/sec permeability requirement since locally available clay soils could only be compacted to a permeability slightly greater than the state standard. The State would provide such a waiver under the provisions of Section 33-20-01.1-10 (variance).

Response: EPA has proposed to grant a waiver from this requirement and supports the State's action.

- One participant at the public meeting (January 19, 1993) asked if Alternatives 2 and 3 in the Feasibility Study (FS) were mutually exclusive or if a passive gas collection system could be designed with the ability to upgrade to an active system, if necessary.

Response: Due to major design differences, it would be difficult to construct a gas extraction system that could be operated as either a passive or active system. A passive system is based on providing a pathway for landfill gas to flow from the refuse to the atmosphere. The design essentially consists of slotted pipes buried in horizontal trenches that allow gas to seep in and flow to vents at the surface. With an active collection system, a vacuum is applied which induces gas to enter the system through openings in a series of vertical wells and discharge through a blower stacks(s). Consequently, applying suction on a passive system would be ineffective since air from the surface would also be drawn into the system.

- A participant at the public meeting asked if discharging leachate to the city waste water treatment plant could have any adverse effect on the plant and if there was any substantial data to support the evaluation.

Response: The ability of the Minot waste water treatment facility to transport and treat leachate from the landfill was thoroughly evaluated during the RI/FS. The analysis indicated that the operation of the facility would not be adversely affected by the leachate and that established discharge standards could be attained. This evaluation is presented in the "Leachate Treatment Evaluation Technical Memorandum" (SEC Donohue; July 13, 1992) and is included in the FS as Appendix D.

- A realtor provided an article (Newsweek; November 23, 1992) at the public meeting that described the use of plants in cleaning up hazardous waste sites and wanted to know if this technology could be applied at the Old Minot Landfill site.

Response: According to the article, the application of plants in cleaning up certain types of hazardous chemicals is encouraging, but the research is still in the experimental stages and is largely confined to a few types of soil contaminants. Furthermore, the use of plants to collect contaminants would be ineffective in preventing the accumulation of landfill gases and contaminated ground water beneath the landfill cap. Soil contamination at the Old Minot Landfill is not a major concern since contaminated materials will be consolidated beneath the landfill cap. As a result, the potential for benefitting from the use of certain plants in remediating the site is somewhat limited.

Scope of the Site Remedy

- During the public meeting, a proposed alternative, developed and adopted by the City of Minot, was presented by the Minot City Manager. Substantial modifications to the City's original proposal were addressed in letters received from the City of Minot on January 25, 1993; February 16, 1993; and March 3, 1993. Several letters of support for the City's plan were also received from area businesses and organizations, the NDS DH, Senators Dorgan and Conrad, and Representative Pomeroy.

The City maintained that the Baseline Risk Assessment (BRA) confirmed that the Old Minot Landfill is a normal small town landfill and, therefore, it should be treated as such. The City's revised final proposal (dated March 3, 1993) contained the following elements.

- (a) Submit all project plans and specifications to the NDS DH for review and approval.
- (b) Place and compact additional clay in areas where the cover is less than three feet. Cap repair would be performed by City crews using City equipment and City-owned clay material.
- (c) Remove the Deucalion gas-extraction wells and contaminated soils adjacent to the well locations; bury the collected soils under the cap.
- (d) Construct drainage systems to control surface water runoff.
- (e) Remove any buried debris or garbage, located north of the earthen dam at the north end of the site, and place the debris/garbage under the repaired cap.
- (f) Utilize the three existing leachate sampling wells as the leachate collection system. The three wells would be connected to a pumping system and to the sanitary sewer system using six-inch PVC sewer pipe. If this system is not successful in reducing leachate levels in the landfill, additional wells would be installed.
- (g) Install a passive gas venting system at each of the existing leachate sampling wells. If the passive gas system proves to be ineffective, new leachate collection wells would be designed to allow for installation of an active gas collection system to solve the methane gas problem.
- (h) Relocate fencing as necessary and maintain the fence. The Minot City Council would enact controls to prohibit: construction on the landfill; human activities at the site; and the use of ground water beneath or in the vicinity of the landfill.
- (i) Implement a monitoring program that would include: using existing monitoring wells; monitoring surface erosion; monitoring ground water to detect future releases of leachate; and to monitor potential impacts to the City's waste water treatment facilities.
- (j) The North Dakota State Department of Health (NDS DH) would provide oversight for planning efforts, construction, and monitoring.

Response: With respect to the findings of the BRA, it should be noted that both current and future risk scenarios for the site were analyzed. Under the existing circumstances, the site does not pose any current risks to human health or the environment. However, the risk assessment analysis also determined that there is the potential for significant future cancer risks to the public, if remedial actions are not implemented.

Items (a) and (j) address the issue of oversight roles and responsibilities, but do not specifically address the preferred alternative. The NDSHD's role in Remedial Design (RD) and Remedial Action (RA) oversight will be established through a site-specific enforcement agreement to be entered into by the NDSHD and EPA, prior to RD or RA.

In principle, Items (b), (c), (d), (e), (h), and (i) are consistent with the preferred alternative. The cap must comply with all federal and state regulations, or a waiver must be obtained by the City. Also, the City's crews must be qualified to perform the Superfund work; the equipment and material must also meet all pertinent criteria. All of the proposed activities will be planned in more detail during the RD phase.

While Item (f) is, in principle, consistent with the preferred alternative, specific decisions concerning the number of wells and types of construction material will be developed during the remedial design process. A phased approach to well installation may be appropriate and will be evaluated as part of the design efforts.

Implementation of Item (g) cannot be accomplished, from an engineering point of view. Construction of a passive gas collection system requires that the collection piping be placed horizontally and within the landfill mass. The passive gas collection system, as discussed in Alternative 2 of the Proposed Plan, cannot be easily converted to an active gas collection system due to economic and technological considerations. Finally, it must be noted that the methane gas is contaminated with volatile and semi-volatile organic compounds.

- Two parties commented that EPA should have considered a broader range of alternatives than the three developed in the FS. Specifically, the comments recommended that an alternative consisting only of appropriate institutional controls together with comprehensive environmental monitoring be implemented at the site. The parties felt that such an alternative remedy would be as protective in the short term, would allow for the detection of any off-site contaminant migration, and would be far less costly than the alternative selected in the Proposed Plan.

Response: The RI indicated that ground water within and immediately adjacent to the landfill, as well as gases emanating from the landfill, are contaminated. In order to ensure that contamination is contained at the site and isolated from potential receptors, remedial activities are necessary. According to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 CFR 300.430(a)(1)(iii)(D)], the use of institutional controls shall not substitute for active measures as the sole remedy, unless such active measures are determined not to be practicable. As a result of the FS, the proposed cleanup measures were found to be practicable.

With regard to the ground-water monitoring suggestion, both Alternative 2 and Alternative 3 include plans for a ground-water monitoring program.

Site Delisting

- A participant at the public meeting asked if there were any sites in the nation that have been deleted from the NPL, and if cleanup of those sites was required prior to delisting.

Several comments were also received that advocated delisting of the Old Minot Landfill from the NPL. Justification for this request was based on the assertion that data from the RI/FS do not support the assumptions that initially placed the site on the NPL, and the fact that the Baseline Risk Assessment (BRA) indicated that there was presently no risk at the site because no complete exposure pathways were identified for current site conditions.

Response: According to 40 CFR 300.425(e), a site may be deleted from the NPL if no further action is appropriate. To delete a site from the NPL, one of the following criteria must be met:

- (a) Responsible parties have implemented all appropriate response actions required; or
- (b) The RI has shown that the site poses no threat to public health or the environment and that implementing remedial measures is unnecessary.

The Old Minot Landfill does not qualify under either of these requirements, for the following reasons. First, the Old Minot Landfill RI definitively demonstrated that ground water within and immediately adjacent to the landfill, as well as landfill gases emanating from the landfill are currently contaminated. Secondly, the BRA determined that the site does pose a threat to public health or the environment and that significant future risks to humans may occur if remedial measures are not implemented.

RD/RA Oversight

- Several parties considered EPA oversight costs to date, as well as anticipated future oversight costs, to be excessive. EPA was urged to put the North Dakota State Department of Health (NDS DH) in charge of oversight during the Remedial Design/Remedial Action (RD/RA) phase in order to reduce oversight costs. NDS DH commented at the public meeting and in writing that it would be willing to accept this role at the site.

Response: This issue is not part of the remedy selection process and will be investigated after the Record of Decision (ROD) is issued. EPA is actively working to increase NDS DH's role in overseeing and implementing the cleanup activities. NDS DH's responsibilities for oversight of the cleanup may be established through a site-specific enforcement agreement, which would be signed by both EPA and the State of North Dakota.

Enforcement

- One party expressed the concern that EPA's short list of potentially responsible parties (PRPs) represents a mere fraction of area businesses which contributed waste to the landfill. The comment stated that "financial viability" appeared to be the most significant factor in identifying PRPs to date, and urged EPA to expand the PRP group in order to achieve a swift and fair resolution. One citizen at the public meeting also wanted to know how many PRPs have been identified for the site at this time.

Response: EPA is continuing to research potential owners, operators, and contributors to the landfill and will evaluate PRPs in a thorough and fair manner. The identification of PRPs is not directly relevant to the Proposed Plan, and is within the purview of EPA.

For the RI/FS, EPA sent special notice letters to nine PRPs and expects that approximately the same number of special notices will be sent out for the RD/RA phase following issuance of the ROD.

Site Risks

- One party commented that the findings in the Baseline Risk Assessment (BRA), which indicated that the landfill may potentially pose a future threat, were not well documented or supportable. The party believed that the site posed neither a current nor future threat to human health or the environment and requested that EPA revise the BRA so as to consider "more realistic" exposure scenarios. Supporting documentation used in EPA's determination of potential future risk was also requested.

Response: In accordance with 40 CFR 300.430(d)(4), EPA must use data from the RI to conduct a baseline risk assessment to characterize the current and potential threats to human health and the environment. The purpose of the BRA is to evaluate risks that might exist if no remediation or institutional controls were applied at the site. The BRA is a tool that is used to assess the need for remedial action. Since no complete exposure pathways were identified for current site-use conditions, no risk presently exists. However, there is a potential for land use to change and/or contaminants to migrate off-site in the future, resulting in the completion of currently incomplete pathways. As a result, currently available site data were used to estimate risks associated with hypothetical future exposures. Both average-case and worst case exposures (i.e., most likely exposure (MLE) and reasonable maximum exposure (RME) scenarios, respectively) were evaluated.

The exposure scenarios developed for the site were based on the conceptual model and incorporate the use of standardized EPA methods and assumptions in assessing potential site-related risks. The future potentially exposed receptors who were evaluated in the BRA consist of: (1) adult residents and occupational workers who live or work at or in the immediate vicinity of the site,

and (2) active children between the ages of 3 and 12 years who live or play in the immediate vicinity of the site, including those who may depend on water from local shallow aquifers as their sole source of potable water.

Specific exposure routes that were evaluated include: the inhalation of landfill gases and volatile contaminants released from soil or surface waters; and ingestion or dermal contact with ground water, soil, sediment, or surface waters. Standard EPA default exposure values were used in quantifying potential exposures at the site. Exposure parameters corresponding to the national 90th percentile upper-bound confidence limit were used for the RME scenarios, and the 50th percentile average value was adopted for the MLE scenarios. Methods and values used were obtained from the following EPA guidance documents: (1) Risk Assessment Guidance for Superfund (RAGS), Volume I, Part A: Human Health Evaluation Manual (1989); (2) Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (1991); and (3) EPA's Exposure Factors Handbook (1989).

Assumptions used in estimating risk are provided and discussed in the Exposure Assessment portion (Section 3) of the BRA. A conservative approach was used in the risk assessment to account for uncertainties and ensure adequate protection of human health and the environment. Toxicological information used in estimating risks was primarily obtained from the Integrated Risk Information System (IRIS; October 1991), the Health Effects Assessment Summary Tables (HEAST; 1989), and the Hazardous Substances Databank (HSDB; October 1991). Supporting documentation used in developing the BRA is referenced, as appropriate, in the report.

- At the public meeting, a member of the community asked if any citizens had complained of potential health risks at the site since the City of Minot had performed the fencing and cap repair work in 1989.

Response: Mr. Alan Walter, Director of Public Works for the City of Minot, responded at the public meeting that the City had not received any citizen complaints about the site since the emergency removal work was performed.

Public Participation Process

- EPA received several written requests for a 30-day extension to the public comment period.

Response: The end of the public comment period was extended from February 2, 1993 to March 4, 1993.

Miscellaneous Questions and Comments Received at the Public Meeting

- One participant at the public meeting asked if the site were to be re-scored (i.e., Hazard Ranking Score (HRS)) today, using the information currently known about the site, would the score still be high enough to make the NPL? Another person asked if the site could be re-scored under the new Superfund Accelerated Cleanup Model (SACM) to see if it should remain on the NPL.

Response: EPA cannot speculate on whether or not the site would still score high enough to be placed on the NPL if it were re-evaluated today. The SACM program does not score sites for inclusion on the NPL. SACM was established to coordinate available resources within EPA at new sites in an effort to streamline and accelerate the Superfund process.

- At the public meeting, one City official stated that he believed the criteria used in the Superfund process to evaluate remedial alternatives were biased and forced the City to perform an excessive cleanup under the circumstances.

Response: EPA believes that the nine evaluation criteria used to select a remedy are not inherently biased and are valuable in comprehensively and fairly assessing the remedial options. The nine evaluation criteria have been developed to address CERCLA requirements and other statutory considerations as well as technical and policy issues. These evaluation criteria serve as the basis for conducting the detailed analyses during the FS and for subsequently selecting an appropriate remedial action. This detailed analysis is needed to evaluate the most promising alternatives selected during the screening process and provides the decision maker with a standardized method for comparing alternatives and developing the rationale for choosing

a preferred remedy.

- One participant at the public meeting wanted to know if there was any evidence that Site B at the Old Minot Landfill was contaminated. The Minot City Attorney wanted the record to show that the City of Minot disclaims any responsibility for Site B.

Response: Based on available analytical data there is no substantial evidence linking environmental contamination of surface water, ground water, or sediment with Site B. Detections of organic compounds in surface water and ground-water samples appear to be related to laboratory induced contamination, and no inorganic compounds are significantly elevated above background levels. Low levels of several polycyclic aromatic hydrocarbons (PAHs) were detected in a sediment sample collected in the northeast portion of Site B, but all concentrations were estimated and were below laboratory detection limits. It should also be noted that PAHs are commonly found in the environment and may have resulted from the dumping of charred lumber or the burning of wood in nearby fireplaces. During the drilling and completion of one borehole within Site B, strong petroleum odors were reported. While no domestic or industrial wastes were observed during the drilling project, construction debris was routinely encountered. No borings were completed below a depth of 17 feet.

EPA will continue to evaluate additional information, as it becomes available, and may initiate further investigations if warranted.

Toxic metals such as chromium and lead were detected in all of the samples analyzed, but the highest concentrations were observed in the soil core sample used for background values (8,700 and 17,000 ug/kg, respectively). Other metals detected include: barium, copper, nickel, vanadium, and zinc. In general, inorganic contaminant concentrations in on-site and downstream sediment samples were generally below or essentially the same as background concentrations established from soil core data.